AUDITOR DC I / II
DATA COLLECTOR

Operations Manual

AIMCO

Table of Contents

CE Marking

Declares that this product has been assessed and complies
with the requirements of the relevant CE Directives.

How to use this Manual

This manual is split into sections describing the steps to be taken to configure the Auditor DC for use in measuring and recording torque values.

The following method is adopted throughout this manual.

Keys to be pressed will be shown as the key legend in large type   Example   [ENTR]
Any special instructions or point to note will be shown as

[ENTR] ⟶ ┌─────────────┐
           │ INSTRUCTION │
           │   TO BE   │
           │ FOLLOWED   │
           └─────────────┘
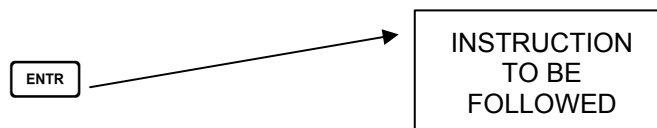
Refer to the table of contents to find action to be performed.

Follow instructions for key presses required to carry out required action.

Note: It is possible to change the default primary character on dual function keys. I.e. when text is entered into various fields, it is possible to set the Auditor DC to default to either the numerals or text as the primary character (the alternate character is selected by pressing the shift key before typing).

To set this:

from Main Menu

Press [→] then press [6] or press [6] (Misc')
Press [→] then press [6] or press [6] (Software Reset)
Press the [↓] 7 times to access the *Shift key* menu
Select between options 1 *Characters* or 2 *Numbers* using [←][→]
Press [MENU] Screen will prompt; 'End of set-up'
Press [MENU] [MENU] to return to main menu

Packing List

The following items are included in the carrying case supplied with the Auditor DC unit.

1 x Auditor DC	1 x Auditor DC (fastcharge model)
1 x Camera (Neck) Strap	1 x Camera (Neck) Strap
1 x 9 way D type to 9 way D type PC cable	1 x 9 way D type to 9 way D type PC cable
1 x 9 way D type to 25 way D type Printer cable	1 x 9 way D type to 25 way D type Printer cable
1 x Charging Unit (Max. current 500 mA)	1 x Fastcharge Charging Unit (Max. current 1 A)
1 x User Manual	1 x User Manual

DISPLAY

KEYPAD

STATUS
LED

BATTERY
CHARGING LED

CHARGER
SOCKET

LED
(fast charge
machines only)

PRINTER/PC
CONNECTOR

TRANSDUCER
CONNECTOR
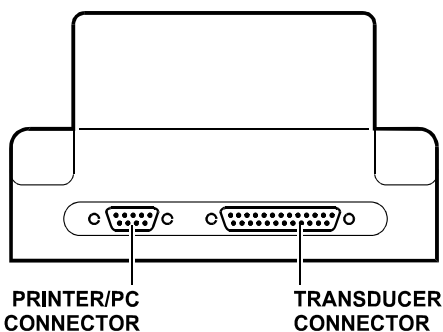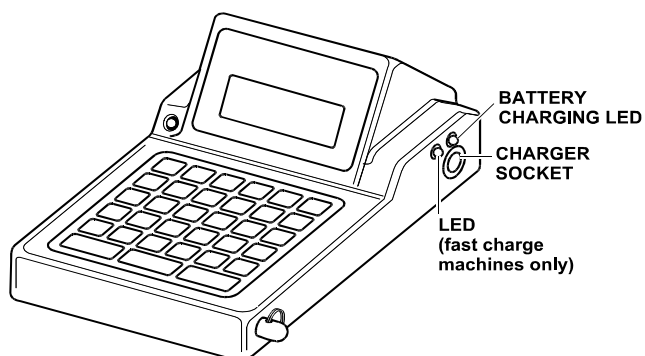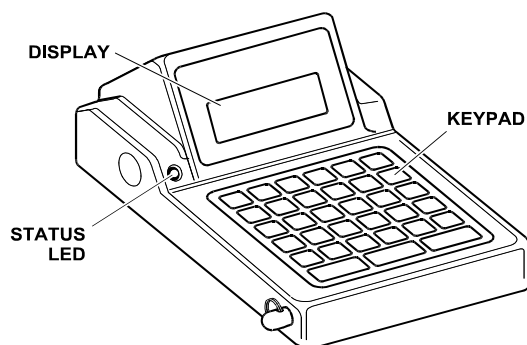
Rear View

Care & Storage

When not in use the unit should be returned to the supplied carry case.

This unit is designed for indoor use only

Operating temperature range   5-40 degrees C

Storage temperature range   0-50 degrees C

The membrane keypad may be wiped clean with a soft damp cloth. The unit is not waterproofed and spillages should be avoided.

THIS UNIT CONTAINS NO USER SERVICEABLE PARTS. ONLY QUALIFIED SERVICE PERSONNEL SHOULD REPLACE OR FIT PARTS.

Battery Charging

The batteries in the Auditor DC unit are shipped fully charged.

In continuous use with a transducer connected the batteries have a life of at least 8 hours.

To charge the batteries following a period of use. Connect the supplied charger to the charging socket on the right hand side of the unit. Plug in the charger to a suitable supply and switch on. The LED indicator above the charging socket will light (Red) to indicate that the unit is being recharged. From fully discharged the unit will require a charging period of 16-20 hours.

The batteries in the unit comprise a 7 cell NiCad with a capacity of 1.6Ahr.

With the unit switched off from a 10% charge state, the batteries will fully discharge in 25-50 days. To prevent the loss of all set-up data, the unit has additional battery backup for the internal memory.

Automatic Power Off

To conserve battery life in use, the unit will switch off automatically after a predefined period. Pressing the on key will restore the unit to the last display prior to powering off.

Optional Fast Charge

Auditor DCs with optional Fast Charge, are supplied with internal NiMH (Nickel Metal Hydride) batteries. These are environmentally friendly batteries presenting no problems for safe disposal and are capable of sustaining a rapid recharge. From fully discharged the unit will require a charging period of only 2.5 hours approx. Auditor DC model having this feature are identified by the additional green LED next to the existing LED above the mains adapter socket.

When the mains adapter is plugged into the socket and switched on at the mains, the green LED will come on to indicate the machine is charging and will start to flash when the unit is fully charged. If the red LED comes on, this means there is a problem and usually indicates a faulty battery.

The Fast Charge option also gives an increase in the effective life of the charged batteries.

NOTE: The mains adapter for the Fast Charge model terminates in a slightly larger diameter plug. This prevents the use of a standard mains adapter for charging the fast charge batteries. No attempt should be made to recharge the NiMH batteries using the standard mains adapter - failure to heed this warning could result in damage to the unit. The fast charge adapter can, however, be used to charge a standard Auditor DC.

Edit Transducer File

The following section deals with the editing of transducer files
This section can be skipped if using Auditor Smart type Transducers.
If using any other types of transducer then the following instructions for 'Edit Transducer File' must be followed before any reading or measurements can be taken.

All Auditor Smart type transducers have in-built circuitry which allow the Auditor DC to identify the range of the transducer and calibrate the readings automatically. No set-up is necessary for these types of transducer.

There are 5 other types of transducer which the Auditor DC will accept.

1. High Output: (H/O) these transducers have an internal amplifier and give an output signal level of 1-2 Volts.

2. Industry Standard (IS): These transducers have no internal amplifier. The exact span or rated torque will be marked on the transducer nameplate. The sensitivity of these transducers is 2 mV/V., they are fitted with a 350 Ohm bridge.

3. Serial: These are digital type transducers and produce an RS232 signal

4. Keypad (KPD): This is an optional keypad which connects to the Auditor DC.

5. Keyboard (KEY): Keyboard on Auditor DC

Use of any of the above 5 transducer types requires that settings are made in the transducer file before any measurements can take place. The procedure for entering settings is given below.

At main menu press $\boxed{1}$ (Configure)

press $\boxed{2}$ (Edit Tx)

Screen will show

Transducer
B (Current set-up)
Complete set-up

The 'B' indicates that this is the 'B' file in memory. It is the first of 8 memories (labelled B to I) reserved for the saving of transducer set-ups. Your most used transducer setting should be stored in this memory.
The remaining memories (C to I) may be accessed by pressing $\boxed{\leftarrow}\boxed{\rightarrow}$.

Press $\boxed{\text{ENTR}}$

Select transducer type H/O, I/S, SER, KPD or KEY using $\boxed{\leftarrow}$ $\boxed{\rightarrow}$ press $\boxed{\text{ENTR}}$

Depending on type of transducer selected above continue set-up in the appropriate section overleaf.

If you have chosen I/S

Select units of measure - inlb, ftlb etc. using ← →   press   ENTR
type in transducer span-   press   ENTR
type in mV/V   press   ENTR
type in Bridge resistance   press   ENTR
type in Pulses Per Rev   *press*   ENTR   *(Auditor DC II only)*
type in serial Number   press   ENTR

To set-up another transducer   press MENU 2
Select another memory (B to I) using the ← → keys and   press   ENTR

to return to the main menu   press MENU MENU

If you have chosen SER
select location of decimal point using ← →   press   ENTR

select Baud Rate, Data Bits, Stop Bits and parity in the same manner
to set-up another transducer   press MENU 2

Select another memory (B to I) using the ← → keys and   press   ENTR
to return to main menu   press MENU

If you have selected H/O
Select units of measure- inlb, ftlb, etc. using ← →

> **Note:** High Output devices usually produce an output voltage of approximately 1-2Volts. This analogue voltage signal will not be exact and may not be linear. If you are using a device that has a nominal 1Volt output, we suggest that you multiply the span of your transducer by 2.5 to determine the new span setting.

Type in your new span   press   ENTR
type in Serial Number   press   ENTR
screen will indicate 'End of Set-up'   press MENU MENU

Connect your high output device and select measure mode
(refer to instruction sheet for measure mode only)

Use an independent measuring device to apply a torque to the transducer and check the reading on the independent unit against the reading shown on the Auditor DC. It will be necessary to return to the 'Edit Tx' menu option and adjust the span setting until the two readings agree. You may have to repeat the above procedure several times until your high output transducer is correctly calibrated.

If you have selected KPD

Select location of decimal point using $\boxed{\leftarrow}\boxed{\rightarrow}$ then   press $\boxed{\text{ENTR}}$
Select Parity- *Odd*, *Even* or *Disabled* using $\boxed{\leftarrow}\boxed{\rightarrow}$ then   press $\boxed{\text{ENTR}}$
To set-up another transducer   press $\boxed{\text{MENU}}\boxed{\textbf{2}}$
Select another memory (B to I) using the $\boxed{\leftarrow}\ \boxed{\rightarrow}$ keys and   press $\boxed{\text{ENTR}}$
To return to main menu   press $\boxed{\text{MENU}}$

If you have selected KEY

Select location of decimal point using $\boxed{\leftarrow}\boxed{\rightarrow}$ then   press $\boxed{\text{ENTR}}$
To set-up another transducer   press $\boxed{\text{MENU}}\boxed{\textbf{2}}$
Select another memory (B to I) using the $\boxed{\leftarrow}\ \boxed{\rightarrow}$ keys and   press $\boxed{\text{ENTR}}$
To return to main menu   press $\boxed{\text{MENU}}$

Barcode read input for characteristic names and comments.

It is now possible to scan a barcode name in Auditor DC at certain prompt lines. The input of a barcode is allowed at the characteristic name prompt in store characteristic, direct characteristic and edit characteristic modes. In addition it is also possible to scan a barcode in the comment field in store characteristic only. Edit characteristic and normal store behave in a slightly different manner to direct characteristic.
The Auditor DC will accept most bar code reading formats, but not all.

General Operational Method for Scanning bar Code data.

Connect the Bar Code Reader to the Printer/PC connector at the rear of the Auditor DC.
Bar code readings can generally be taken at the prompt to input data (Characteristic name or a comment) when the flashing cursor is on the screen. This can be on a blank line or following a line of data (an existing characteristic or a comment). When the cursor is flashing, swipe the code with a bar code reader and observe the screen. If the flashing cursor disappears, the code has been captured - wait a few seconds for the data to appear in the display. If the flashing cursor remains, re-scan the code until it is accepted.
When the data is displayed, press $\boxed{\text{ENTR}}$ to continue. From this point, follow the instructions as for normal data input.

When entering data via the bar Code reader into a comment field, make sure you have reserved enough characters in the comment field to accept the code. If the number of characters scanned in exceeds the number reserved, the Auditor DC will beep and refuse to accept the data. Refer to the instructions on *Configuration* for more details.

Measure Mode (Up to 200 readings stored)

To start   press [ON]

                                Press [MENU]

                                Press [2] (measure)

plug in transducer then press [ENTR]

> select proper transducer using [←][→]
> then press   [ENTR]
> If using I/S or H/O type transducers
> continue with instruct
> If using SER, KPD or KEY you are now
> ready to take measurements

select units of measure   using [←][→] press [ENTR]

select peak, track, Impulse or 'Click Dip' using [←][→] press [ENTR]
Note: Impulse available on Auditor DC II only

select measurement direction   using [←][→]   (Right is clockwise. Left is anti-clockwise)

                                          press [ENTR]

select 'Cycle end Time'   using [←][→] press [ENTR]

select frequency response   using [←][→] press [ENTR]

type in Max torque value   press [ENTR]

type in Min torque value   press [ENTR]

type in threshold torque value   press [ENTR]

> **Note**:   When selecting a threshold torque value the Auditor DC will ignore any torque which is below
> this value. You cannot take another reading until the applied torque falls below this value.

type in amount of Dip   press [ENTR]
select Second Parameter   *using* [←][→] *press* [ENTR] *(Auditor DC II only)*

If the set-up and transducer has not been changed since the Auditor DC was last used you are now ready to take torque measurements.

Pressing [#] after taking a series of readings will result in statistical information being displayed (Range, mean and standard deviation) for the stored readings. To return to measure mode press [#]

If you have selected 'Click Dip' type in the amount of 'Dip' to be sensed press [ENTR]

You are now ready to take torque measurements.   When finished press [MENU]

Note: When taking readings you can change the set-up parameters by pressing the up arrow $\boxed{\uparrow}$ Changing any of the set parameters will result in the Auditor DC prompting to erase all data.

To erase stored readings press $\boxed{\text{ENTR}}$

To return to set-up screens press $\boxed{\text{MENU}}$

Example: You have been measuring in a right hand direction and you want to switch to left hand. Press the up arrow twice, change from right hand to left hand. Screen will prompt to erase all data press $\boxed{\text{ENTR}}$ to erase all stored readings and return to the measure screen.

Printing of stored readings from measure mode

Pressing $\boxed{\text{P}}$ from the measure mode will result in all stored readings being printed to an

attached printer.

Note: Transducer needs to be connected to Auditor DC.

Measure mode circle-store option

Circle-Store is a function to increase the number of stored readings to extend beyond the normal maximum of 200 readings possible in measure mode. With the circle-store option selected, readings will be accepted beyond the 200 limit but the first readings taken will be lost. Effectively the last 200 readings taken will be stored but the user is not limited to taking only 200 readings.

To select this option:

From main menu

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Misc')

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Software Reset)

Press the $\boxed{\downarrow}$ 6 times to access the *Circle-store* menu

Select option 2 *Circle-store On* using $\boxed{\leftarrow}\boxed{\rightarrow}$ press $\boxed{\text{ENTR}}$

Press $\boxed{\text{MENU}}$ Screen will prompt; *'End of set-up'*

Press $\boxed{\text{MENU}}\boxed{\text{MENU}}$ to return to main menu

Direct Measure Mode (Smart Type transducers only)

Direct measure mode is to allow an operator to connect different transducers which may have different spans and an angle output and can switch between them using an external T switch. This is a display only function and readings are not stored or printed out.

To start   press [ON]

press [MENU]

press [4] (Direct)

press [1] (Direct Measure)

press [1] (Set-up)

select units of measure   using [←][→] press [ENTR]

select peak, track, Impulse or 'Click Dip' using [←][→] press [ENTR]
Note: Impulse available on Type II only

select measurement direction   using [←][→] (Right is clockwise. Left is anti-clockwise)

press [ENTR]

select 'Cycle end Time'   using [←][→] press [ENTR]

select frequency response   using [←][→] press [ENTR]

type in the Threshold Percent. (mx 50.0   mn 0.0) and press [ENTR]

type in amount of Dip (mx 100.0Nm   mn 0.0Nm) and press [ENTR]

select Second Parameter   *using* [←][→] *press* [ENTR] **(Auditor DC II only)**

Screen shows; *'End of set-up'*   press [MENU] to exit

Press [MENU][MENU] to return to main menu

The READ option allows you to read the torque from a connected transducer.

From the main menu   press $\boxed{4}$ (Direct)

press $\boxed{1}$ (Direct Measure)

press $\boxed{2}$ (Read)

If no transducer is connected, display will prompt; 'Insert Tx' (transducer)

connect transducer and   press $\boxed{\text{ENTR}}$

Screen will show the span of the connected transducer and the torque measured in units selected at set-up. The display will show the last reading taken until the next torque input exceeds the threshold level set.

Note: if password protection has been set on Direct measure, then exit is by password only. A correct password returns you to the set-up read sub-menu. Entering three incorrect passwords will force the user back into read mode. See password protection later in this book.

To Display Recorded Data

From main menu press ⑨ (Display/Analyse)

Screen will show job name and Specs press →

Screen will now show x-bar, R and sigma for total readings

From any Subgroup display press ↓ (down arrow)

Screen will show the Date and Time the readings for that subgroup were taken

Press ↓ (down arrow) screen will show subgroup comment.

Press ↓ (down arrow) again to see the individual readings displayed in groups of four readings per screen

To View Cp and Cpk

At the job name/spec screen press ↓ (down arrow)

screen will show the Cp and Cpk and the number of samples used in the calculations
press ↓ (down arrow)

Screen will now show x-bar, R and sigma based on all of the data (all subgroups calculated together)
The number of samples that were NOK will also be displayed expressed as a percentage.

Press ↓ (down arrow)

Screen will show the highest and lowest torque's recorded and the number of readings that were above the maximum torque value and minimum torque value.

To return to the main menu press MENU

For more information on Cp, Cpk and CAM, please refer to the glossary on page 23.

French Cp and Cpk

It is possible to view the French Cpk/CAM calculations as an alternative to the standard Cp and Cpk. Readings must be a minimum of 30 samples.

To set this function:

From main menu

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Misc')

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Software reset)

Press $\boxed{\downarrow}$ 5 times to access the Cpk Calculation screen

Use the $\boxed{\leftarrow}$ and $\boxed{\rightarrow}$ arrow keys to access option 2 *French Cpk/CAM* and press $\boxed{\text{ENTR}}$

Press $\boxed{\text{MENU}}$ to confirm. Screen will prompt; *'End of set-up'*

Press $\boxed{\text{MENU}}$ to accept and exit or $\boxed{\rightarrow}$ to edit

Press $\boxed{\text{MENU}}$ to return to main menu

Returning to Normal Cpk calculations is done as above, selecting option 1 *Normal Cpk/no CAM*

For more information on Cp, Cpk and CAM, please refer to the glossary on page 23.

To Erase Stored Data and Set-ups

To Erase readings stored in measure mode

From the main menu press ☐2 (Measure)

then press ☐Y

Screen will prompt 'Erase Measure data?'

press ⎡ ENTR ⎤ to erase data

or press ⎡ CLR ⎤ to ignore and continue

Printing

To print details of set-up or analysis of data

To print readings taken in measure mode

Connect Auditor DC to printer and switch printer on

On Auditor DC

Press [ON]

Press [MENU]

Press [→] (right arrow) then press [5] or press [5] (Print))

Press [→][→][→]   then press [8] or press [8] (Print Measure)

Auditor DC will print details of stored readings taken in measure mode (with date/time stamp)

A sample printout can be found in Appendix A

To return to main menu press [MENU]

To set Date and time

From main menu

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Misc')

Press $\boxed{1}$ (Set Date/Time)

Select date format using $\boxed{\leftarrow}\boxed{\rightarrow}$

Enter date and time and press $\boxed{\text{ENTR}}$

To return to main menu press $\boxed{\text{MENU}}\boxed{\text{MENU}}$

To set Power Off and Backlight Time Delays

From main menu

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Misc')

Press $\boxed{2}$ (Select Power Off/Backlight Time Delays)

Select Power Off time delay using $\boxed{\leftarrow}\boxed{\rightarrow}$ press $\boxed{\text{ENTR}}$

Select Backlight Delay using $\boxed{\leftarrow}\boxed{\rightarrow}$ press $\boxed{\text{ENTR}}$

To return to main menu press $\boxed{\text{MENU}}\boxed{\text{MENU}}$

To Configure Printer Port

From main menu

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Misc')

Press $\boxed{\rightarrow}$ then press $\boxed{3}$ or press $\boxed{3}$ (Printer port)

Select Baud Rate using $\boxed{\leftarrow}\boxed{\rightarrow}$ then press $\boxed{\text{ENTR}}$

Select number of data bits using $\boxed{\leftarrow}\boxed{\rightarrow}$ then press $\boxed{\text{ENTR}}$

Select number of Stop Bits using $\boxed{\leftarrow}\boxed{\rightarrow}$ then press $\boxed{\text{ENTR}}$

Select Parity using $\boxed{\leftarrow}\boxed{\rightarrow}$ then press $\boxed{\text{ENTR}}$

To return to main menu press $\boxed{\text{MENU}}\boxed{\text{MENU}}$

To Display Software Version Number

From main menu

Press $\boxed{\rightarrow}$ then press $\boxed{6}$ or press $\boxed{6}$ (Misc')

Press $\boxed{\rightarrow}$ then press $\boxed{4}$ or press $\boxed{4}$ (Version #)

To return to main menu press $\boxed{\text{MENU}}\boxed{\text{MENU}}$

To set Password Protection

From main menu

Press ☐→ then press ☐6 or press ☐6 (Misc')

Press ☐→ then press ☐5 or press ☐5 (Password)

Screen will prompt; *'Enter new Password'*

Type in the password (4 characters) and press ☐ENTR

Screen will prompt; *'confirm password'*

Press ☐ENTR to accept or ☐CLR to reject

Select desired option using ☐←☐→.   Options for protection are:

1.   *Power up*
2.   *Configure*
3 . *Direct Measure*
4.   *Direct Char*
5.   *Software Reset*
6.   *Date and Time*

Press ☐# to protect your selected option or ☐MENU to exit

NOTE: when an option is password protected, # appears in the top right of the display window.
    Pressing ☐# will remove the protection

Press ☐MENU to exit

Display now reads: *'End of set-up'*

To return to main menu press ☐MENU or press ☐↑ to edit password protection.

The remaining options can be password protected in the same manner.

To clear Password Protection

From main menu
Press ☐→ then press ☐6 or press ☐6 (Misc')

Press ☐→ then press ☐**5** or press ☐5 (Password)

Screen will prompt; *'Password'*   Enter the existing password (4 characters) and press ☐ENTR

Screen will prompt; *'Confirm Password'* and display the existing password

Press ☐ENTR to confirm or press ☐CLR to clear the password protection.

Screen will prompt; *'Enter new Password'*
Press ☐ENTR to clear the password
(keying in 4 characters before pressing ☐ENTR will result in a new password being created)

Screen will say *'Confirm password'*

Press ☐ENTR to confirm and password is cleared.

Notes on Password Protection

Be aware of the implications of password protection. Always keep a note of the chosen password somewhere safe. As there is no function to enable an existing password to be removed without it first being entered, it may be advisable for the person who is ultimately responsible for the Auditor DC to initially set a password and issue it only to personnel who need the information. This will prevent an unknown password being entered, accidentally or deliberately, without anyone else's knowledge. If an unknown password is encountered, please contact AIMCO for advice.

To Perform Software (S/W) Reset

CAUTION: Use of this function will result in the loss of all stored data. Following this procedure will return the Auditor DC to its factory default state. This feature should only be used when it is desired to clear all settings from the Auditor DC.

From main menu

Press ⬜→ then press ⬜6 or press ⬜6 (Misc')

Press ⬜→ then press ⬜6 or press ⬜6 (S/W Reset)

Press the ⬜↓ key 8 times to access the Software Reset screen.

Screen will display *'Erase all data and set mode?'*

To carry out S/W reset   press ⬜ENTR

To exit without performing S/W reset   press ⬜MENU

Screen will display *'ERASING ALL CHARACTERISTICS ROUNDS AND MASTER ROUNDS'*
- wait a moment for display to change

Select Subgroup mode using ⬜←⬜→ and press ⬜ENTR screen will say *'End of set-up'*

To return to main menu press ⬜MENU ⬜MENU

There are a number of other parameters which are set from the Software Reset Menu, some of which are detailed elsewhere in this manual.

Pressing ⬜ENTR after making a selection will take the user on to the next screen.

Pressing ⬜MENU will give the user the option to exit to the Misc menu by pressing ⬜MENU or continuing to edit by pressing ⬜↑.

Screens can be skipped using the ⬜↑ and ⬜↓ keys.

These are the settings in the order they appear when the *Software Reset* Menu is accessed.

Cm max samples	-	type in the required figure
Cm min samples	-	type in the required figure
Language	-	select using ⬜←⬜→
Autoprint mode	-	select using ⬜←⬜→
Capability label	-	select using ⬜←⬜→
Cpk Calculation	-	select using ⬜←⬜→
Circle-store (On/Off)	-	select using ⬜←⬜→
Shift key mode	-	select using ⬜←⬜→

To Communicate With a PC
(optional software required)

Connect Auditor DC to PC via cable provided

On PC start PCComms Software

On Auditor DC

Press [ON]

Press [MENU]

Press [→] then press [8] or press [8]

You can now set-up and view all information/data via the PC

> **NOTE:** This optional PC software is used primarily to write and store characteristics and rounds on the PC. The format of the data stored on the PC, is of little use to the computer operator without further processing.

Printout of Readings taken in Measure Mode

```
AUDITOR DC                          07/01/95 12:39:12



MEASURE-Peak                      Capability Results  Torque
----------------------------      -------------------------
No of Samples     200             Based on last   15. samples
Transducer        A UTA 75.00 Nm  /x                  6.96 Nm
Serial Number:        99999       Range               8.30 Nm
Measurement Dir   Right           Sigma               2.210
Max Torque Value  20.00 Nm        Cp                  0.754
Min Torque Value  10.00 Nm        Cpk              -  0.458
Thrshld Torq Val   2.00 Nm        Max found          12.65 Nm
Freq response     1676 Hz         Min found           4.35 Nm
Cycle end time     0.1 Sec        Readings above max    0.
                                  Readings below min   13.
                                  Percentage not OK   86.66 %



                  Date     Time                    Torque


      1           07/01/95 12:38:32                 7.21 LO
      2           07/01/95 12:38:35                 4.87 LO
      3           07/01/95 12:38:38                 6.65 LO
      4           07/01/95 12:38:40                 6.56 LO
      5           07/01/95 12:38:42                 7.45 LO
      6           07/01/95 12:38:45                 5.76 LO
      7           07/01/95 12:38:47                 7.07 LO
      8           07/01/95 12:38:49                12.65
      9           07/01/95 12:38:52                 9.37 LO
     10           07/01/95 12:38:54                 5.29 LO
     11           07/01/95 12:38:56                 6.09 LO
     12           07/01/95 12:38:59                 4.35 LO
     13           07/01/95 12:39:01                 5.90 LO
     14           07/01/95 12:39:04                 5.25 LO
     15           07/01/95 12:39:06                10.03
```

Glossary of Terms

Characteristic	Specification of one particular torque value to be collected. Each characteristic has a name of up to 14 characters, 8 if downloaded from a PC. Auditor DC can store up to 48 different characteristics at any one time.
Cp	This is a capability index which shows the process capability potential but takes no account of how centred the process is. This is used for capability studies and Cp may range in value from 0 to infinity. A large value indicates greater potential capability and a value of 1.33 or greater is desirable.

$$Cp \ = \ \frac{Max \ - \ Min}{6}$$

(Max and Min are limit values)

CpK	This is an index which indicates whether the process will produce units within the tolerance limits. If the process is centred on the nominal value then CpK will have a value equal to Cp. For values of CpK between 0 and 1 then some of the 6 sigma spread will fall outside tolerance limits but for values greater then 1 these will all be within tolerance. A negative value of CpK indicates that the process mean is outside tolerance limits. A value of 1.33 or greater is desirable.

$$CpK \ = \ lesser \ of \quad \frac{(Max \ - \ -)}{3} \quad or \quad \frac{(\ - \ - \ Min)}{3}$$

(Max and Min are limit values)

CAM	This is an alternative capability index requiring a minimum of 30 readings to be taken. In this implementation, 5 sub-groups of 6 samples are used for each calculation. The CAM calculation uses the following formula:

$$\frac{Max \ - \ Min \ x \ Cam \ Factor \ *}{6 \ x \ Average \ Sample \ Value}$$

* CAM Factor is taken from a table (in the case of 5 x 6 samples = 1.910)

High Output Transducer (H/O)	Torque transducer with no coding links but internal pre-amplifier giving an output signal level of typically 1 or 2 volts.
Horizontal sampling	Collection of data by round, taking one reading for each characteristic in turn.
Industry Standard Transducer (I/S)	Type of transducer, with no pre-amplifier or coding links, but with the exact rated torque, marked on the body.
Master Round	A sequence of up to five rounds. It is used to allow a collection sequence, which is part vertical, part horizontal.
Max Torque	Upper tolerance level of any reading. This can equal but not exceed the

Value	torque rating of the transducer to be used.
Min Torque Value	Lower tolerance level of any reading.
No. of Sub Groups	Number used to allocate memory space in Auditor DC, for a particular characteristic. May be set in the range of 1 to 99.
Round Sample	A sequence of characteristics to be collected either horizontally or vertically. Each round has a name of up to 14 characters, 8 if downloaded from the PC. Individual torque reading.
Standard Deviation	Is a measure of the variation of the samples of a statistical group. If a group of n values has a mean of x- then its standard deviation is given by;

$$= \sqrt{\dfrac{\displaystyle\sum_{i=1}^{n}(x_i -)}{n - 1}}$$

Sub-Group	grouping of samples to enable analysis, with an allowable range of 1 - 50.
Threshold Torque Value	level of torque, which a signal must rise above and then fall below, to be considered a valid torque cycle. This may be set in the range of 1 to 50% of rated span or the Min Torque Value, whichever is the lower.
Units of Measure	It is possible with Auditor DC to read a transducer calibrated in say Nm and convert internally to display and store in any of the other torque units.
Vertical	Collection of data by round, where a full sub-group is collected for a characteristic, before stepping to the next characteristic.
Vertical plus Prompt	Identical in procedure to that of Vertical mode except that before stepping to the next characteristic, Auditor DC will prompt for the fitting of a transducer (even though the correct one is installed) and will require the ENTR key to be pressed.

Error Messages

Code	Message	Explanation
101	RANGE	The selection made is not within the allowable range. See the limits specified max to min.
104	EXISTS	The characteristic name entered already exists.
105	NO SPACE	Insufficient memory space is available to create a new characteristic.
106	NONE	No characteristics have been created.
107	ON PC	Characteristic or round was sent from PC. These may not be edited or erased on Auditor DC.
108	CONV' OUT OF RANGE	The units selected would generate too great or too small a number.
109	NO NAME	A characteristic name must be entered.
110	NO SET-UP	The characteristic exists but configuration is not complete.
111	NO DATA	The characteristic exists, but no data is stored.
113	DAT STR	More than one sub group of data is now stored.
114	ALL STR	All of the sub groups for this characteristic have now been collected. Erase these after printing to allow further collection.
120	NO Tx	UTA Transducer has been selected but none is connected.
121	TxID - FLT	Transducer ID level not recognised. Use another transducer or get transducer recalibrated.
122	AZ OFSET	An auto-zero calibration on the transducer has detected an excessive offset from zero.
123	AZ DISCR	An auto-zero calibration on the transducer has detected an excessive discrepancy between the Tracking and Peak inputs.
124	Tx FAULT	ADC saturation due to transducer fault, no transducer fitted or over torque
200	INCOR-TX	The correct UTA transducer is not connected.
300	IN ROUND	This characteristic has already been included in the round.
301	CHARACTS	A minimum of two characteristics must be defined before entering Edit Round.

306	RS232	Invalid RS232 data on the serial input.
400	INVALID	Incorrect time or ate format.
600	ONLY 1	Only one round programmed so not possible generate master round.
601	NO RND	No rounds programmed so not possible to generate master round.
602	IN M RND	This round has already been entered into the master round. It is not possible to enter a round twice.
701	RND COMP	The round is complete, no skipping is allowed.
702	ALL SKIP	All other characteristics have already been skipped.
800	MEMORY	Message on power up if memory error found. (See 6.4)
801	MENU ERR	Invalid menu entered due to fault.
802	PROM CKS	The EPROM has an error.
803	OP CODE ERR	The processor has attempted to execute an illegal instruction.
804	STACK ERR	The processor stack has overflowed.
901	TX SPEC	Illegal transducer specification number received from PC.
902	TX TYPE	Illegal transducer type received from PC.
904	TX UNITS	Illegal transducer units data received from PC.
905	SERIAL	Illegal serial transducer data received from PC.
906	UNITS	Illegal units of measure data received from PC.
907	DIRECT	Illegal direction data received from PC.
908	NAME	Name sent from PC is too long.
909	RANGE	Numeric Parameter sent from PC is out of range.
920	RS232	Error receiving RS232 data from PC.
921	TIMEOUT	Timed out receiving message from PC.
922	CRC	Message received from PC has incorrect CRC value.
923	ILL MSG	Illegal message received from PC.

NOTE: If Auditor DC can be switched on, but fails to respond to the keyboard, the electronic circuitry may be reset by linking pins 5 and 6 in the PC connector, with a length of wire. This will turn the unit off. Turn the unit on again by pressing 'ON'. If after this reset Auditor DC still fails to operate correctly, use '6' for Miscellaneous and '6' Software Reset to clear memory. Having carried out a hardware reset as described above the message '800 MEMORY' may be displayed on the next power up, and a software reset should be carried out.

External Connections

TRANSDUCER CONNECTOR

1   0V
2   High Level I/P
3   +5V
9   -Ve Excitation
13 +Ve Excitation
14 -Ve Signal
15 +Ve Signal

PRINTER/PC CONNECTOR

1   RTS Ready To Send
2   Rx Receive Data
3   Tx Transmit Data
4   DTR Data Terminal Ready
5   -0V
6   Not Reset
7   Analogue O/P
8   CTS Clear To Send
9   +5V

CHARGER SOCKET
Centre   +12V
Outer   -0V